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IDS Filed: July 18, 2007
Inventor: RITCHEY, Jonathan G.
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54 Method of production of general purpose and drinkable quality water and the necessary equipment

57 A device to obtain water of drinkable quality from the atmospheric humidity over a large body of water (1), such as the ocean, is done by immersing a U—shaped condenser (7) into the water. This device has an intake lid with, a feed pipe (11) which is extending beyond the surface of the water 1 and drain pipe 16 leading to the outflow opening (19a). The outflow opening (19a) extends higher than the intake 19a and between the condenser (7) and the outflow 19a is a vertical drain (17) which is covered with a film to absorb the solar radiation. The solar radiation heats the vertical drain pipe (17) which creates a convection current and that sucks the hydrated air through the condenser (7). In the condenser (7) the hydrated air is liquefied and Subsequently pumped out (10).

[Illustration]

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Patent Claims

1. A method for obtaining drinkable quality water from a large body of water whereby a condenser (7) is immersed into the water (1) an intake pipe (11) feeds the hydrated air into it and the air is subsequently released into the environment.
2. Method as per Patent Claim 1 of operation is obtained in part that a convection flow occurs in the upper part (17,117,217) of the drainpipe (16, 116, 216) as well as the air contained therein is heated up by the solar radiation_
3. Method as per Patent Claim 1 is shown that an intake pipe (1) with an approx. horizontal opening lid and that the opening lid of the intake pipe (11) faces the wind direction.
4. Device to execute the method as per Patent Claim 1 using a condenser (7) in which the naturally humid air is cooled and thus liquefied, an intake pipe (11) feeds the hydrated air into the condenser (7) and a drainpipe (16, 116,216), which is made so that the intake pipe (11) has an opening lid and that the: drain pipe (16,116,216) has an outflow opening (19a).
5. Device according to Patent Claim 4 is made in such a manner that the drain pipe (16,116,216) has a roughly vertical section (17,117,217) and the pipes (11,16,116,216) are installed in such a manner that the sun heats the air in drain pipe (16,116,216) more than it heats the air in the intake pipe (11).
6. The device as per Patent Claim 5 is made so that the outflow opening (19a) extends beyond the intake pipe (11d).
7. Device as per Patent Claim 5 is made so that outer surface of the drain pipe (16,116,216 absorbs more heat than the outer surface of the intake pipe 11).
8. Device as per Patent Claim 5 is made so that the drain pipe (116) has fins (117b) on the inside so that the heat exchange of the air rushing through the drain pipe (116) is accelerated.
9. Device as per Patent Claim 5 has at least one reflector (218) to reflect the solar radiation onto the drainpipe.
10. The device as per Patent Claim 4 is made so that the intake pipe (11) has an approx. horizontal entry section (11) which sits on a turntable.

The invention constitutes a method to produce water of drinkable quality at a large body of water by extracting the natural occurring humidity of the air by liquefying the hydrated air in a condenser and to collect the condensate.

A well known process consists of distilling sea to obtain potable water. The sea water is fed into the evaporator of a distilling apparatus. The water j.3 heated to produce steam which is then liquefied in a condenser and collected.

With this well known process the water is heated by electric heat or oil furnaces and so vaporized. The disadvantage of this method is that it is very expensive because of its great demand for energy.

Another method uses the sun to condense water. This method is inexpensive but has the disadvantage that the result in comparison to the size required and the execution is quite small. That means in order to obtain a given production the device would have to be quite large which, again, would be quite expensive to produce.

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This invention's aim is to create a method to obtain potable water at a large body of water, in particular the sea shore, with a relatively small device and at low operating costs but nevertheless large quantities of water.

This objective is being solved by the method described at the beginning which ingeniously immerses the condenser in the water, with it with the natural occurring humid air by means of an intake pipe and subsequently emits the air into the environs. Preferably the airflow is, at least partially, increase by the vertical drain pipe and also that the air inside the drainpipe is being heated by the sun.

This invention has a device to execute this method with condenser, which condenses the hydrated air by cooling it, to feed the condenser with air by means of an intake pipe and a drain pipe, connected to the condenser, to remove the air. This ingenious device is so designed that an intake pipe has an air intake opening which sits above the condenser and an outflow opening extending beyond the condenser which releases the air into the environment.

This invention differs from other methods in that steam is not produced by creating steam inside the apparatus but by utilizing the humidity that naturally exist in the air. This makes it possible to eliminate the energy necessary to create steam. With this ingenious device it is only necessary to expend enough energy to let the hydrated air flow through the condenser and to pump out the water. This small amount of energy can be partially supplied by the sun and wind. Therefore, its operating cost would be inexpensive.

This invention will be explained by means of schematic drawings of the device.
Diagram (1) gives a side view of a device for obtaining potable water with a round outflow pipe.
Diagram 2 depicts a drawing of a rectangular section of a device for removing the waste air.
Diagram 3 is a section along the line of diagram 2 and
Diagram 4 a cross section of a device equipped with a reflector.

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In diagram 1 is shown a body of water, in particular the sea, and 2 the sea floor. There is also shown the complete device 3 to obtain potable water from the surrounding air.

The device 3 shows a platform 4 above the surface of the water which is attached to the sea floor 2 by means of legs 5. In case the water is very deep, a floating platform can be used. The device shows a condenser 7 which is formed by a U-shaped pipe immersed into the water and which is attached to the platform 4 with a flanged pipe 6. The lower arched part 7a has longitudinal:Etn-671). A collecting tank 8 is connected to the lower, part of the condenser 7 by way of a connecting pipe 8a. From the bottom of the collecting tank 8 a pipe 9 goes to the pump 10 situated on the platform 4 and this pump 10 has a spout 10a.

The left end of the condenser 7 shown in diagram 1 is connected to feed pipe. This shows a short vertical section 11 with a 900 bend and short roughly horizontal air intake section 12d. The latter has a funnel shaped extension 11d. The vertical intake pipe 11a is connected to the condenser 7 by means of an approx. vertical turn table. The bearing 12 is flanged 13 to the platform 4. On the air intake pipe 11 a vertical plate 15 is mounted on the opposite side on the swivel axis of the intake pipe by means of rod 14.

The intake pipe 11 has a very good reflective surface, i.e. a surface which has a very low absorption rate of visible light. As seen in diagram 1 the right side of the condenser 7 is connected to the air outflow pipe 16. The air outflow pipe 16 consists of an approx vertical, with a round diameter metal section 17 which serves as a collector of radiant energy and is covered with an absorbent film 17a. The latter has the ability toabsorb a great part of visible light and in regards to radiant heat has great reflective powers, i.e. it absorbs very little heat. The upper end of the vertical section 17 is connected by means of a swivel coupling 18 to the 90° bent pipe whose free end forms the air outflow opening 19a. On both sides of the outflow opening 19a is a plate 21 which is attached to it with a rod 20 which runs vertical and parallel to the axis of the outflow opening 19a

The following explains the operation of the device shown in diagram 1.

It is assumed that the sun is shinning and that the solar-radiation comes from the direction indicated by the arrows 31. The air drain pipe 16, and in particular the vertical section 17 will be heated by the solar radiation. This also causes the air in the drainpipe 16 to heat up and the air, therefore, rises. As the air intake pipe 1.1 is covered with a reflective film the air inside the intake pipe 11 will heat up very little. As the air drainpipe 16 is heated it creates a vacuum which causes the surrounding air to be sucked into the intake opening lid of the intake pipe 11, flows into the condenser 7 and exits by way of the drainpipe 16.

Should it also be windy, then, as shown in this example, it is assumed that it blows from the left as shown by the arrows 32. The force of the wind will exert pressure on the plate 15 and the air intake pipe 11 will be turned into the direction the wind is coming from and the intake opening lid will be facing the wind. Conversely the 2 plates 21 turn the bent pipe 19 of the air drain pipe so that the outflow opening 19a faces the lee side. A wind will, therefore, increase the convection stream produced by the radiant heat.

As the device is located by the sea shore or some other large body of water it is assumed the surrounding air is saturated. The condenser 7 is immersed to that depth of the water where the temperature of the water is at least 10°, preferably 15° lower than the outside air temperature, A part of the inherent humidity of the air is then condensed in the condenser 7. The condensate will then flow into the storage tank 8 and is then brought up to the surface by a pump 10, either continuously or as needed. The spout 10a of the pump 10 can be connected to a reservoir where the water is stored until needed. Depending on the intended use of the water certain minerals or other agents can be added to it.

Diagrams 2 and 3 show a variation of the drainpipe 116 with a vertical section 117 having been added. The latter shows a rectangular view and has an absorbent film 117a on the outside of one of the broader sides, which has great degree of absorption of any existing visible light. The broadside with the absorbent film 117a has longitudinal fins 117b on the inside. The vertical drain pipe section 117 has a hollow, round cylindrical plug 118 at its lower part. This unit is connected to the end of the condenser 107 by means of a flanged pipe 119 and to the swivel coupling 120 which is attached to the platform 104. There is also a swivel device 121 a motor 122 with a gear 123 is mounted. The swivel device 121 is equipped with a sensor as well as a steering and control mechanisms which are not shown, whose job it is to steer and control the motor 122 in such a way that the absorbent film 117 is always facing the sun. The sun rays will always fall onto the absorbent film as indicated by the arrows 131. The outside of the other, always turned away from the sun, broadside of the vertical drainpipe 117 can then reflect the visible light and the radiant heat so that it will emit very little radiant energy.

The variation of the air drain pipe as shown in diagram 2 and 3 results in an improved use of the radiant heat which results in improved heating up of the air contained in it as opposed to the variation shown in diagram 1. The longitudinal fins 117b also contribute to an improved heat exchange within the drain pipe.

Diagram 4 shows another variation of the air drain pipe 216. This variation shows a cross section of a metallic vertical round section 217 which is covered by an absorbent film 217a and is connected to the condenser 207 which is situated below the platform 204. There is a reflector mounted to intensify the radiant heat hitting the drainpipe section-:217. The reflector 218, as

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shown in the section view, is approx. parabolic arranged and formed so that its focal line coincides with the geometric axis of the vertical drain pipe section 217. The reflector 218 and the drainpipe section 217 are attached to a coaxial turn table 219.

This is mounted on pivot bearings 220 which is attached to the platform 204 by a flanged pipe 221. There is also a swivel device 222. This consists of a motor 223 with a gear 224. The latter is mated with a gear 225 which is secured to the turntable 219. The swivel device 222 also has a steering and control device not shown so that the motor can be steered and controlled so that the inner surface of the reflector 218 always faces the sun.

It is quite obvious that the device can be altered in various ways. For instance, the drain pipe 216 shown in diagram 4 can be replaced by the drain pipe 1.16 shown in diagram 2 and 3. Then the drain pipe has to be turned at the same time as the reflector Furthermore the drain pipe can be enclosed in a translucent glass coating in order to reduce heat loss which together with metal inside tube of the drain pipe forms a hollow space which is tightly sealed.

Of course the characteristics of the surface of the intake pipe as well as the absorbent film covering the drain pipe can be modified so that they suit the local conditions. For instance, if apart from the solar radiation there is also another source of heat then the surface of the intake pipe has to be redesigned so that it will reflect not only the radiant heat but also the heat from the other source. At the same time the drainpipe or more precisely its absorbent film can be changed so that it absorbs both the solar radiation and the heat from the other source.

Also a piece of insulation made out of a plastic material can be attached to the lower part of the drain pipe. By using this insulation the heat conductivity of the drainpipe and the condenser as well as the platform is reduced and this also reduces the cooling of the drain pipe.

The intake pipe can also he equipped with heat insulation so that the air passing through is heated very little. As the wind is also used this device can also be operated on windy nights. Apart from the sun power extra power may be required to pump out the condensed water and to also operate the swivel devices. Nevertheless, this device is very inexpensive in its operation.

In areas that are very windy there exists also the possibility that the pump can be operated by the wind power. It is also possible to install the pump at the storage tank.

That would be absolutely necessary if the water had to be pumped up from a depth of more than 10 m. It is also possible to install a small pump into the intake or drain pipe to increase the air flow through the condenser. In windy areas the pump can be attached to a windmill so that you have a wind driven pump. Of course, the pump would have to modified in such a way that it would also work when there is no wind, i.e. when the pump stands still, so that a convection stream can still occur. One can, of course, run the pump either continuously or in the absence of wind by way of a small electric or some other motor. One can also use a bypass to bridge the pump when the pump is standing still.